Research Experience and Interests

Mineral and material science with an emphasis on physical chemistry and structure-property relationships.

1) Synthesis, preparation and design of various materials and minerals.
2) Fast ion conductors and battery research (e.g. solid-state Li oxides).
3) Micro/nanoporous materials - molecule interactions at inner surfaces.
4) Structure-physical property relationships of various inorganic materials, minerals and especially solid-solution phases.
5) Thermodynamic behavior of materials.
6) Behavior of various materials under high-temperature (up to 2000 °C) and high-pressure conditions (up to 15 GPa).

Experimental Techniques:

1) X-ray powder and single-crystal diffraction measurements (including synchrotron radiation).
2) Various spectroscopic techniques including - UV/VIS, FTIR, NIR, Raman, NMR, Mossbauer.
3) Various calorimetric and thermal analysis (TGA/DTA) measurements.
4) Nondestructive chemical analysis with the electron microprobe, SEM and optical microscopy.
5) High-pressure and high-temperature instrumentation - diamond anvil cell, solid-media pressure devices, hydrothermal experimentation.